PEACE/WILLISTON
FISH & WILDLIFE
COMPENSATION
PROGRAM

BC hydro

BRITISH
COLUMBIA

A Reconnaissance Survey of Unnamed Lake (Fish Hook Lake)

M. J. Hunter
March 1997

PWFWCP Report No. 160

The Peace/Williston Fish & Wildlife Compensation Program is a cooperative venture of BC Hydro and the provincial fish and wildlife management agencies, supported by funding from BC Hydro. The Program was established to enhance and protect fish and wildlife resources affected by the construction of the W.A.C. Bennett and Peace Canyon dams on the Peace River, and the subsequent creation of the Williston and Dinosaur Reservoirs.

Peace/Williston Fish and Wildlife Compensation Program, 1011 Fourth Ave. 3rd Floor, Prince George B.C. V2L 3H9

Website: *www.bchydro.bc.ca/environment/initiatives/pwcp/*

This report has been approved by the Peace/Williston Fish and Wildlife Compensation Program Fish Technical Committee.

Citation: M. J. Hunter. March 1997. A reconnaissance survey of Unnamed Lake (Fish Hook Lake). Peace/Williston Fish and Wildlife Compensation Program, Report No. 160. 23pp plus appendices.

Author(s): Mark J. Hunter[1]
Address(es): [1] Peace/Williston Fish and Wildlife Compensation Program, 1011 Fourth Ave., 3rd Floor Prince George, B.C. V2L 3H9

A RECONNAISSANCE SURVEY OF

UNNAMED LAKE (FISH HOOK LAKE)

WATERSHED:	**Nation River**
DATE OF SURVEY:	**September 5 - 6, 1996**
FIELD CREW LEADER:	**Mark Hunter**
FIELD ASSISTANT:	**Neil Hunter**
REPORT PREPARED BY:	**Mark Hunter**

BRITISH COLUMBIA CONSERVATION FOUNDATION

PEACE / WILLISTON FISH AND WILDLIFE COMPENSATION PROGRAM

B. C. MINISTRY OF ENVIRONMENT, LANDS AND PARKS

FUNDED BY: FOREST RENEWAL BRITISH COLUMBIA

RELEASED BY: _____

D. J. Cadden, Regional Fisheries Biologist

105-02080/

LAKE: Unnamed (Fish Hook Lake) SYSTEM NAME: **Nation River**

A.S.A.P. REFERENCE NO.: **WATERSHED CODE: 237-2729-450**

DATA ON FILE FOR THIS SURVEY

Location	X	Dissolved 02 / Temp. Profiles	X
Physical Data	X	Winter Dissolved 02 / Temp. Profiles	--
Bench Mark	X	Netting Record	X
Terrain Features	X	Lake Catch Summary	X
Access	X	Individual Fish Data	X
Resorts and Campsites	X	Fish Preserved	--
Other Developments	X	Stomach Analysis	X
Obstructions and Pollutions	X	Scale Reading	X
Special Restrictions	X	Location of Inventory Sites	X
Aquatic Plants	X	Photograph Directory	X
Wildlife Observations	X	Appendices	
Miscellaneous Comments	X	A: Water Chemistry Analysis	x
Lake Drainage	X	B: Tributary Stream Data	X
Fisheries Management Comments	X	C: Fish Scale Analysis	X
History of Previous Surveys	X	Bathymetric Map Reduction	X
Water Chemistry Summary	.X	Bathymetric Map	--

LOCATION

Location:	approximately 63 km southwest of Mackenzie		
Elevation:	1075 m ± 25 m	U.T.M.:	10.440680.6098416
Latitude / Longitude:	55°01'45" 123°55'41"	N.T.S. Map No.:	93 - 0 / 4
Management Unit:	7-28	Biogeoclimatic Zone:	Sub-Boreal Spruce
Ecoprovince:	Sub-Boreal Interior	Ecoregion:	Fraser Basin
Ecosection:	Babine Uplands		

Drainage: Philip C. --> Unnamed P. --> Philip C. --> Philip L. # 1--> Philip C. --> Philip L. # 2 --> Philip C. --> Philip L. # 3 --> Philip C. --> Philip L. # 4 --> Philip C. --> Nation R. Williston Reservoir (Nation Arm - Parsnip Reach) --> Peace R.

PHYSICAL DATA

Lake Drainage Area:	4.9 km^2	Volume:	135 179 m^3
Water Surface Area:	104 909 m^2	Perimeter of Islands:	384 m
Area Above 6 m Contour:	102 358 m^2	Number of Islands:	2
Shoreline Perimeter:	4 355m	Mean Depth:	1.3 m
Maximum Depth:	7.5 m	Secchi Reading:	3.25 m
Filterable Residue (TDS):	90 mg/L		

Sounding Device: Lowrance X-15 Elevation Source: Contour Interpolation

BENCHMARK

(Iron spike, center of red circle) located 2.0 m above present water level in a 20 cm diameter lodgepole pine tree that is 2.8 m from the present water's edge and located on the northeast shore of the lake approximately 125 m from the outlet (Plate # 4).

High Water Mark: 0.10 m above water level at time of survey

93-014
Rainbow
PHILIP LAKES
FINLAY FOREST
CARP FOREST

LAKE: Unnamed Lake (Fish Hook Lake)

TERRAIN FEATURES

Immediate Shoreline:

Fish Hook Lake is fronted on all sides by a floating marsh of common red sphagnum, sedge grasses and Equisetum, with willows and alders growing back from the lake's edge. Lodgepole pine, spruce and fir trees, and scrub birch grow behind the marsh front; huckleberries and bunchberries grow abundantly on the forest floor. The exception to this is along the southeast side of the lake, which has a sedge grass fringe along the water's edge and lodgepole pine trees and scrub birch growing down to the lake's edge.

From the edge of the marsh, there is a vertical drop off to the lake's bottom created because the marsh floats on the water. The exception to this is in the north end of Fish Hook Lake where the outlet drains the lake; the lake's bottom drops off slowly towards the center of the lake. There are some places along the east shore that have a low sloped bottom as well. The shoreline substrate is composed mainly of fines and organics, except in the north end of the lake and along the southeast shore, which have gravels and cobbles mixed in with the fines.

Surrounding Country:

Fish Hook Lake is surrounded by a mature forest of lodgepole pine, spruce and fir trees. Behind the marsh front to the west and northwest, there are low, steep hills with gently rolling hills behind them. To the northeast, there are low, moderately steep hills with gently rolling hills behind. In all other directions, the terrain is mainly gently rolling hills. Fish Hook Lake is situated within the Sub-Boreal Spruce biogeoclimatic zone.

LAKE: Unnamed Lake (Fish Hook Lake)

ACCESS

Directions:

From it's junction with Highway 39, drive south on Highway 97 North for approximately 1.5 km, and turn right on to the Finlay Forest Service Road. Drive for approximately 18 km, then turn left on to the Finlay-Phillip Forest Service Road, and proceed for approximately 30.5 km. Turn right on the North Phillip Mainline and continue traveling for approximately 25 km. Turn left on to the P 18,000 Road and proceed approximately 7.5 km to a clear cut. The total distance from the junction of Highway 97 and Highway 39 to the clear cut is approximately 82.5 km. From this clear cut, Fish Hook Lake is approximately a 4 km helicopter ride to the south-southwest.

Road Type and Conditions:

Highway 97 North is a well-maintained, two-lane paved provincial highway. The two Forest Service Roads are well-maintained, two-lane gravel roads that can be easily traveled in a two-wheel drive vehicle in the summer. The North Phillip Mainline is also a well-maintained gravel road, but is only one lane, and can easily be traveled in a two-wheel drive vehicle during the summer. The P 18,000 Road is a rough, one lane gravel road that could be traveled in a two-wheel drive truck in good weather; a four-wheel drive vehicle is recommended if the weather is bad.

Restrictions:

Although there are no restrictions, it is recommended that a truck radio be used when traveling on all of the gravel roads.

RESORTS AND CAMPSITES

There are no resorts or campsites on Fish Hook Lake.

OTHER DEVELOPMENTS

None noted.

OBSTRUCTIONS AND POLLUTIONS

None noted.

LAKE: Unnamed Lake (Fish Hook Lake)

SPECIAL RESTRICTIONS

None known.

AQUATIC PLANTS

The following aquatic plants were identified during the time of the survey:

Equisetum — sedge grasses
claspingleaf pondweed (Potamogeton richardsonii)

WILDLIFE OBSERVATIONS

The following wildlife or signs were seen during the time of the survey:
moose tracks — merlin
unidentified duck — various songbirds

MISCELLANEOUS COMMENTS

1) There is no really good site to launch a boat from the shore because of the low stability of the floating marsh that surrounds most of the lake. The best location is found on the southeast side of Fish Hook Lake.

2) There is a good location for a Forest Recreation Site on the southeast side of the lake; this area is covered by a flat-floored lodgepole pine forest.

3) Bathymetric map: The lake outline was drawn from an enlargement of air photo BCB 90121: No. 201, flown August 8, 1990.

LAKE: Unnamed Lake (Fish Hook Lake)

LAKE DRAINAGE

General:

Fish Hook Lake is fed by seven inlets that enter along the south and southwest sides of the lake. Philip Creek drains the lake to the north, and flows through an Unnamed Pond and the four Philip before joining the Nation River approximately 40 km downstream of the lake.

Major Systems:

There are no major systems.

Minor Systems:

Inlet # 1 - Unnamed Creek

Inlet # 1 enters Fish Hook Lake in the southeast corner of the lake (Plate # 5). Approximately 20 m upstream of the lake, there is a 0.5 m high beaver dam that was probably not passable to upstream fish movement at the time of the survey due to low flows. From approximately 35 m to 55 m upstream of the lake, the channel is overgrown by willows. Approximately 55 m upstream of the lake, there is a second beaver dam that is 0.85 m high. There was probably not enough flow over the top of the dam to allow for upstream fish movement at the time of the survey. Upstream of this dam for 40 m, the willows has receded from being over the channel to just lining the banks, then grows back over the creek approximately 90 m upstream of the lake. A third beaver dam, 0.6 m high, is located approximately 115 m upstream of Fish Hook Lake; again, this dam was probably not passable to upstream fish movement at the time of the survey due to low flows over the top of the dam. Upstream of this dam, the creek has an average wetted width of 1.5 m and depth of 0.5 m. The substrate is composed of silts and organics with some cobbles and gravels. The banks are vegetated by sedge grasses, willows and scrub birch. Inlet # 1 had no fisheries potential during the survey period.

Inlet # 2 - Unnamed Creek

Inlet # 2 enters Fish Hook Lake in the south end of the south bay (Plate # 6). The creek has an average wetted width of 4.0 m and depth of 0.5 m. The substrate is composed of silts and organics with some large woody debris. The creek is held by banks of moss and willows. Approximately 40 m upstream of the lake, there is a small falls (10 cm) over a moss and sedge grass bank. Inlet # 2 had no fisheries potential during the survey period.

Inlet # 3 - Unnamed Creek

Inlet # 3 enters Fish Hook Lake in the southwest corner of the south bay and partially drains the marsh in that end of the lake (Plate # 7). At the mouth of the creek, the wetted

width is 6.0 m. Approximately 15 m upstream of the lake, the channel braids into two. Each of the braids has an average wetted width of 4.0 m and depth of 0.5 m. The substrate in each braid is composed of silts and organics. Approximately 45 m upstream of Fish Hook Lake, the braids re-join to form one channel. Approximately 55 m upstream of the lake, there is a 0.5 m high falls that was probably not passable to upstream fish movement at the time of the survey due to low flows over the top of the dam. The substrate of the pond formed on the upstream side is composed of silts and organics. Inlet # 3 had no fisheries potential during the survey period.

Inlet # 4 - Unnamed Creek

Inlet # 4 enters Fish Hook Lake in the southwest corner of the south bay and partially drains the marsh in that end of the lake (Plate # 8). The creek has an average wetted width of 3.0 m and depth of 0.4 m. The substrate is composed of silts and organics. Inlet # 4 had no fisheries potential during the survey period.

Inlets # 5 - # 7 - Unnamed Creek

Inlet # 5 enters Fish Hook Lake from the west near the top of the south bay (Plate # 9). Inlets # 6 and # 7 enter the lake on the south side of the west bay. These three inlets drain the marsh along the southwest corner of the lake. Each of the creeks has an average wetted width of 3.0 m and depth of 0.4 m. The substrate in each of the creek is composed of silts and organics with some sedge grasses. On Inlet # 5, there is a 0.4 m high beaver dam located approximately 65 m upstream of the lake. Inlets # 5, # 6 and # 7 had no fisheries potential during the survey period.

Outlet - Unnamed Creek

The outlet drains Fish Hook Lake from the north end of the lake over a 0.7 m high beaver dam located at the edge of the lake that is probably passable to upstream fish movement (Plate # 10). There are cobbles and boulders present downstream of the first beaver dam. Approximately 20 m downstream of the lake, there is a second beaver dam that is 0.3 m high. Water flows through this dam, not over the top of it. The outlet has limited fisheries potential provided by some rearing habitat.

A Stream Survey card was completed for a sample site located approximately 375 m downstream of Fish Hook Lake (Plate # 11 & # 12). The average wetted width is 4.0 m and the average maximum riffle depth is 0.35 m. The creek morphology is runs (50%) and riffles (50%) with a gradient of 1%. The substrate is composed of boulders (60%), cobbles (30%) and fines (10%). The water temperature was 12 °C at the time of the survey. For additional information, refer to Appendix B.

LAKE: Unnamed Lake (Fish Hook Lake)

FISHERIES MANAGEMENT COMMENTS

Fish Hook Lake could support a low use fishery; however, there is not a good site located on the lake for launching a boat because of the marsh that surrounds the lake. Four Gee minnow traps and one experimental monofilament gill net set overnight caught 35 rainbow trout and 25 longnose suckers. In addition, two man hours of fishing on the lake with tackle produced 15 rainbow trout. The rainbow trout in this lake are very healthy; of the 30 rainbow trout sampled, only five had lice on their gills. Daphnia, chironomids and dragonfly larvae appeared to be the main source of food. There was no spawning habitat found in any of the inlets or in the outlet creek. There could be some spawning habitat in the outlet creek further downstream than was surveyed.

HISTORY OF PREVIOUS SURVEYS

Lake Surveys:

None known.

Other Related Studies:

None known.

LAKE: Unnamed Lake (Fish Hook Lake)

WATER CHEMISTRY SUMMARY Limnology Station No. 1

Field Conditions:

Date:	September 6, 1996		
Time:	1225 hrs	Air Temperature:	10 °C
Wind Velocity:	5 - 10 km/h	Wind Direction:	from the S
Cloud Cover:	5 / 10 o.c.	Surface Conditions:	light ripple
Secchi Disc:	3.25 m	Water Colour:	tea colour

Method Used:

Dissolved Oxygen:	YSI Model 57 Oxygen / Temperature Meter
Water Temperature:	YSI Model 57 Oxygen / Temperature Meter
Air Temperature:	Hand-Held Alcohol Thermometer
pH (field):	Digital pH Pocket Tester
H2S (field):	Hach H2S Field Test Kit
Laboratory Used:	Pacific Environmental Science Center
Water Sampler:	Vertical Alpha Water Bottle (Vandorn)
Metal Sampler:	By Hand; Preserved With 2.0 mL Nitric Acid
Substrate Sampler:	Substrate Sample Not Taken

Water Sample Chemistry: **SEAM Site No.:** E 223163

	Sampling Depths	
	Surface (0.5 m)	Lower (6.5 m)
Alkalinity (lab)	58.1 mg / L	37.9 mg / L
Filterable Residue 105°C (lab)	90 mg / L	50 mg / L
H2S (field)	N/A	0.0mg / L
Nitrogen - Total (lab)	0.66 mg / L	0.24 mg / L
Non-Filterable Residue (lab)	17 mg / L	< 5 mg / L
pH (field)	*	*
pH (lab)	6.88	7.35
Phosphorus - Total Dissolved (lab)	0.008 mg / L	0.002 mg / L
Specific Conductance (lab)	116 µS / cm	84 µS / cm

Bottom Depth:	7.5 m
Substrate Sample Depth:	N/A

* a pH reading was not obtained in the field due to equipment malfunction

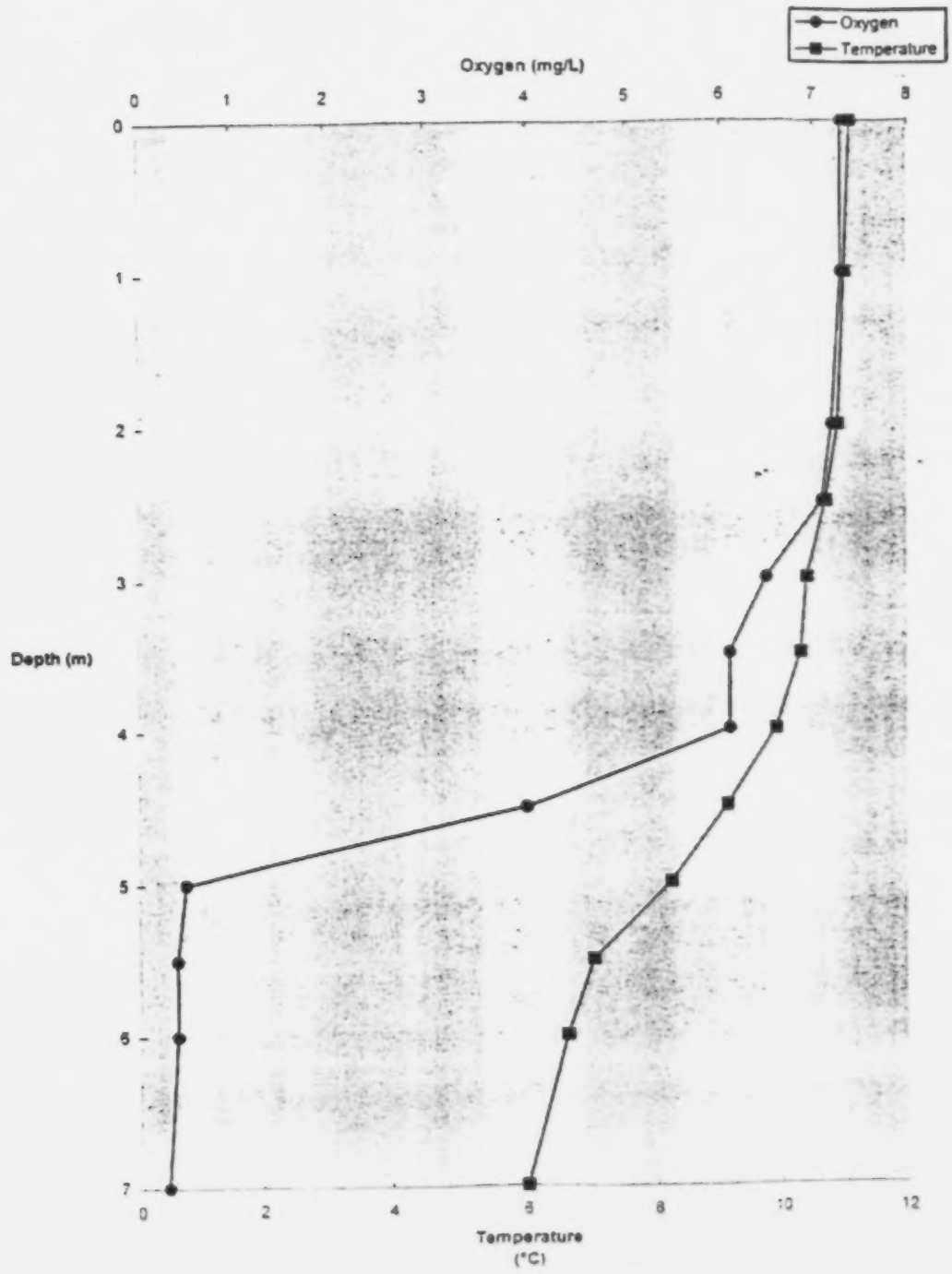
** additional analyzed parameters and results, including metals, are found in Appendix 1

LAKE: Unnamed Lake (Fish Hook Lake)

SUMMER OXYGEN / TEMPERATURE DATA

DEPTH (m)	02 (mg/L)	TEMPERATURE (°C)
Surface	7.3	11.1
1.0	7.3	11.0
2.0	7.2	10.9
2.5	7.1	10.7
3.0	6.5	10.4
3.5	6.1	10.3
4.0	6.1	9.9
4.5	4.0	9.1
5.0	0.5	8.2
5.5	0.4	7.0
6.0	0.4	6.6
7.0	0.3	6.0
7.5	- Bottom	

SUMMER OXYGEN / TEMPERATURE PROFILE



LAKE: Unnamed Lake (Fish Hook Lake)

NETTING RECORD

Mesh Size Experimental Order: 25, 76, 51, 89, 38, 64 mm

NETTING SITE # 1

Type:	Sinking Monofilament Gill Net			
Date Set:	September 5, 1996		Time:	1945 hrs
Date Lifted:	September 6, 1996		Time:	0853 hrs
Net Dimensions:	Length:	91.4 m	Depth:	2.4 m
Shallow End Mesh Size:	25 mm		Depth:	2.0 m
			Substrate:	gravel / cobble
Deep End Mesh Size:	64 mm		Depth:	6.0 m
			Substrate:	fines

Comments: The net started approximately 0.5 m from the shore.

LAKE CATCH SUMMARY

Species	Netting Site NO. 1	Angled	Other	Total	Number Sampled	Number Preserved	Size Range (cm)
RB	35	15	0	50	30	0	11.6-33.5
LSU	25	0	0	25	0	0	10.8-33.6

Minnow Traps:

Bait: Sardines

Trap No.	Hours	Depth (m)	Substrate	Species	No. Caught	Size Range (cm)
1	13:09	1.0	silts / organics with aquatic veg.	dragonfly nymph	1	-
2	13:09	1.5	silts / organics with aquatic veg.	dragonfly nymph	1	-
3	13:10	1.5	silt / organics with aquatic veg.	empty	-	-
4	13:10	1.1	cobble / gravels	empty	-	-

LAKE: Unnamed Lake (Fish Hook Lake)

INDIVIDUAL FISH DATA

Date Captured: September 6, 1996

Method: Sinking
Monofilament
Gillnet

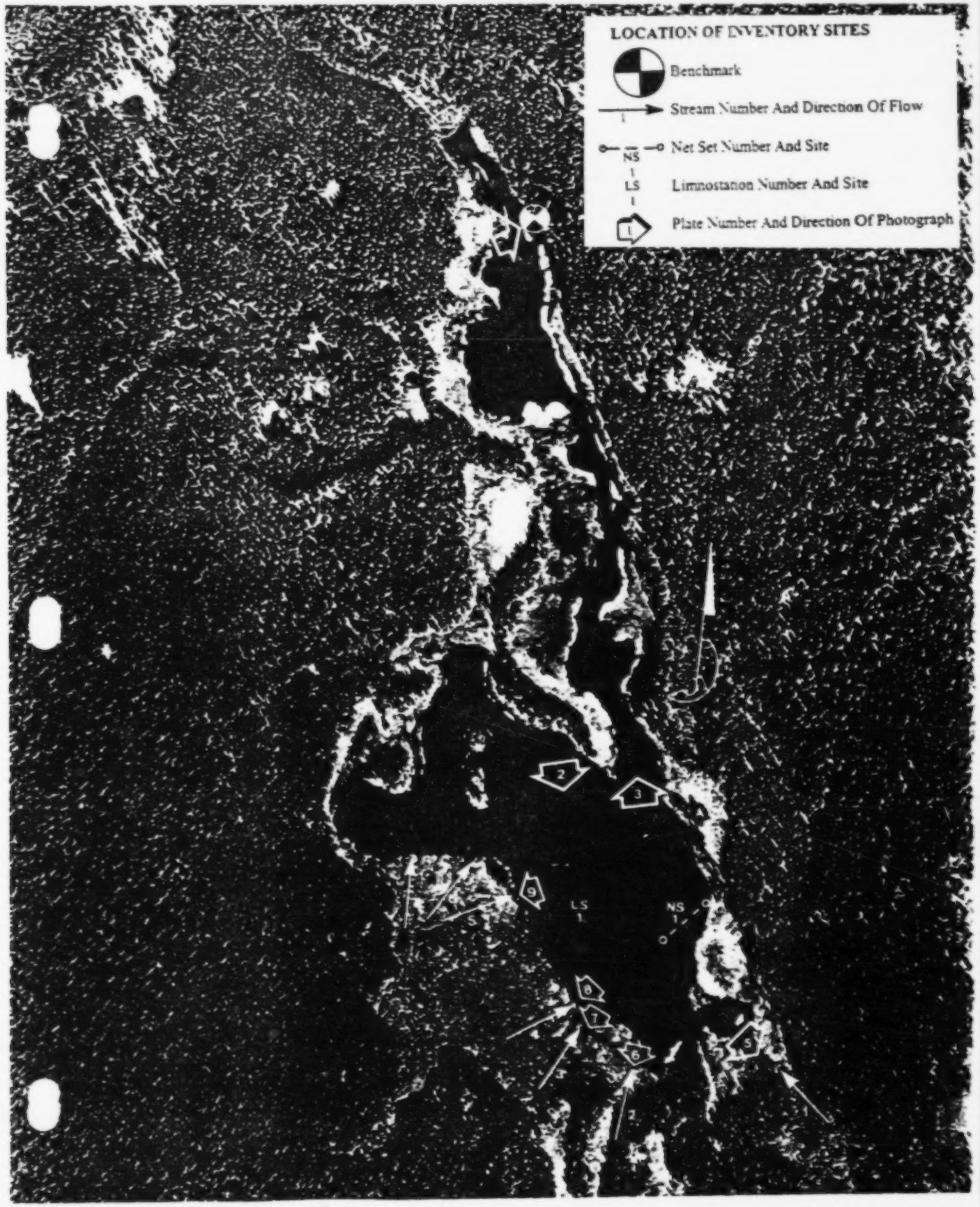
M - Male
F - Female
? - Not Obvious

IMM - Immature
MG - Maturing
MT - Mature
GV - Gravid
SP - Spent
? - Not Obvious

EG - Egg
FR - Fin Ray
HD - Head
ML - Milt
OT - Otolith
SC - Scale

Species	Fork Length (cm)	Weight (grams)	Sex	Gonadal Maturity	Sample Type	Age (yr)	Stomach Contents				Comments
							Plankton	Insects	Fish	Other	
RB	27.8	255	F	IMM	SC	3+	Da				
RB	30.0	323	F	MG	SC	4+	Da	DN			
RB	32.0	405	F	MG	SC	3+	Da, Cr				Li on gills
RB	11.6	12	M	IMM	SC	1+	Da				
RB	32.9	415	F	MG	SC	4+		DN			
RB	33.5	430	F	MG	SC	4+	Da				TW in St
RB	20.0	95	M	IMM	SC	2+	Da	DN			
RB	25.3	204	M	MG	SC	3+	Cr				
RB	30.7	358	F	MG	SC	3+	Da				
RB	21.6	126	M	IMM	SC	2+		aquatic			Li on gills
RB	24.5	192	M	MG	SC	3+		DN			
RB	16.5	55	M	IMM	SC	1+		terrestrial			
RB	12.2	16	M	IMM	SC	1+				empty	
RB	30.4	350	M	MG	SC	5+		DN			
RB	12.3	15	M	IMM	SC	1+				empty	
RB	31.4	372	F	MG	SC	3+				empty	cysts on St
RB	19.4	93	M	MG	SC	1+	Da	aquatic			
RB	30.9	335	F	IMM	SC	3+					
RB	28.2	300	F	MG	SC	4+		DN		fish eggs	Li on gills
RB	18.5	82	M	IMM	SC	1+	Da	DN			
RB	29.8	295	M	IMM	SC	3+				empty	
RB	15.9	44	M	IMM	SC	1+	Da				
RB	30.1	325	F	MG	SC	5+		DN			Li on gills
RB	27.5	250	M	IMM	SC	3+		WB			
RB	30.6	339	M	MG	SC	3+				S	
RB	26.2	227	M	IMM	SC	3+				empty	
RB	18.6	70	M	IMM	SC	1+	Da				
RB	24.1	184	M	MG	SC	3+	Da, Cr				
RB	26.0	215	M	IMM	SC	3+				O	
RB	27.4	258	F	MG	SC	4+	Cr	DN			Li on gills

B - Beetle
C - Clams
CF - Caddis Fly
Ch - Chaoborus
Cr - Chironomids
Da - *Daphnia*
DN - dragonfly nymph
G - *Gammerus*
L - Leech
Li - Lice
O - Organics
S - Snails
St - Stomach
TW - Tape Worm
WB - Water Boatman
WF - Whole Fish


LOCATION OF INVENTORY SITES
Benchmark
Stream Number And Direction Of Flow
Net Set Number And Site
Limnostation Number And Site
Plate Number And Direction Of Photograph
NS 1
LS 1
2
3
9
8
7
6
5

LAKE: Unnamed Lake (Fish Hook Lake)

Plate	Roll : Number	Description
1	25: 21	Aerial view of Unnamed Lake (Fish Hook Lake) looking north.
2	25: 18 - 20	Panoramic view of Unnamed Lake (Fish Hook Lake) looking south from the center of the lake.
3	25: 16 - 17	Panoramic view of Unnamed Lake (Fish Hook Lake) looking north from the center of the lake.
4	25: 5	View of the benchmark located 2.0 m above present water level in a 20 cm diameter lodgepole pine tree that is 2.8 m from the present water's edge and located on the northeast shore of the lake approximately 125 m from the outlet.
5	25: 13	View of the mouth of Inlet # 1 where it enters Unnamed Lake (Fish Hook Lake) in the southeast corner of the lake.
6	25: 12	View of the mouth of Inlet # 2 where it enters Unnamed Lake (Fish Hook Lake) in the south end of the lake.
7	25: 11	View of the mouth of Inlet # 3 where it enters Unnamed Lake (Fish Hook Lake) in the southwest corner of the south bay.
8	25: 10	View of the mouth of Inlet # 4 where it enters Unnamed Lake (Fish Hook Lake) in the southwest corner of the south bay.
9	25: 9	View of the mouth of Inlet # 5 where it enters Unnamed Lake (Fish Hook Lake) on the west side of the south bay.
10	25: 8	Upstream view of beaver dam # 1 on the outlet, located at the edge of Unnamed Lake (Fish Hook Lake). Dam height is 0.7 m.
11	25: 6	Upstream view of the sample site on the outlet, taken approximately 385 m downstream of Unnamed Lake (Fish Hook Lake)
12	25: 7	Downstream view of the sample site on the outlet, taken approximately 365 m downstream of Unnamed Lake (Fish Hook Lake).

LAKE: Unnamed Lake (Fish Hook Lake)

Plate # 1: Aerial view of Unnamed Lake (Fish Hook Lake) looking north.

LAKE: Unnamed Lake (Fish Hook Lake)

Plate # 2: Panoramic view of Unnamed Lake (Fish Hook Lake) looking south from the center of the lake.

LAKE: Unnamed Lake (Fish Hook Lake)

Plate # 3: Panoramic view of Unnamed Lake (Fish Hook Lake) looking north from the center of the lake.

LAKE: Unnamed Lake (Fish Hook Lake)

Plate # 4: View of the benchmark located 2.0 m above present water level in a 20 cm diameter lodgepole pine tree that is 2.8 m from the present water's edge and located on the northeast shore of the lake approximately 125 m from the outlet.

Plate # 5: View of the mouth of Inlet # I where it enters Unnamed Lake (Fish Hook Lake) in the southeast corner of the lake.

Plate # 6: View of the mouth of Inlet # 2 where it enters Unnamed Lake (Fish Hook Lake) in the south end of the lake.

Plate # 7: View of the mouth of Inlet # 3 where it enters Unnamed Lake (Fish Hook Lake) in the southwest corner of the south bay.

Plate # 8: View of the Mouth of Inlet # 4 where it enters Unnamed Lake (Fish Hook Lake) in the southwest corner of the south bay.

Plate # 9: View of the mouth of Inlet # 5 where it enters Unnamed Lake (Fish Hook Lake) on the west side of the south bay.

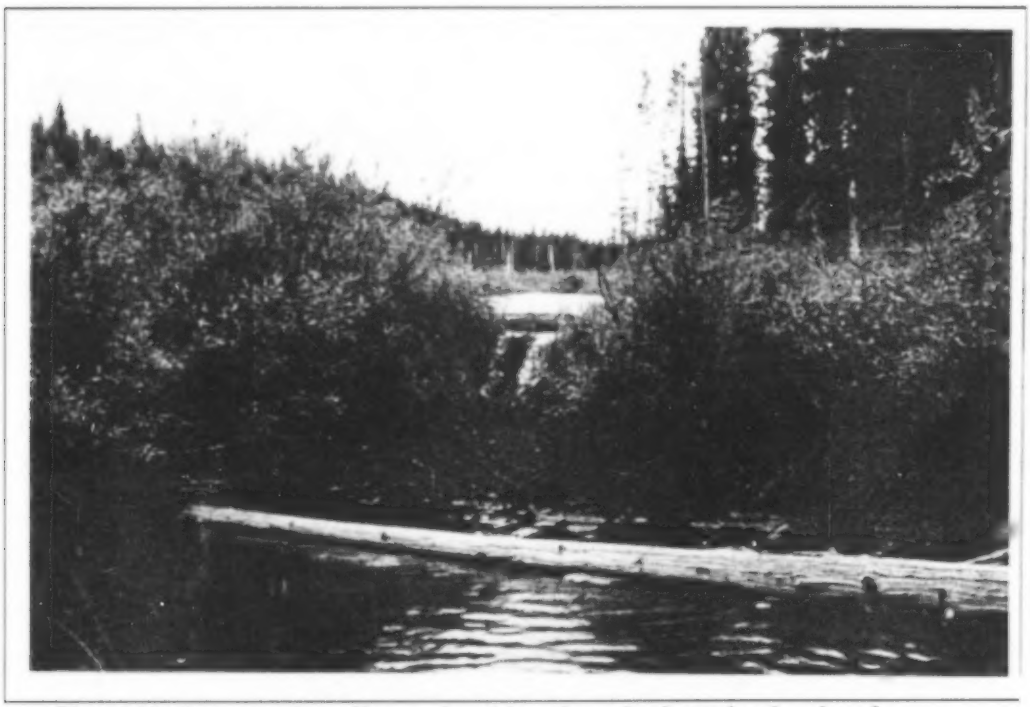


Plate # 10: Upstream view of beaver dam # 1 on the outlet, located at the edge of Unnamed Lake (Fish Hook Lake). Dam height is 0.7 m.

LAKE: Unnamed Lake (Fish Hook Lake)

Plate # 11: Upstream view of the sample site on the outlet, taken approximately 385 m downstream of Unnamed Lake (Fish Hook Lake).

Plate # 12: Downstream view of the sample site on the outlet, taken approximately 365 m downstream of Unnamed Lake (Fish Hook Lake).

Appendix A

LABORATORY REPORT

Water Chemistry Analysis

RESULTS FOR UNNAMED LAKE-RAINBOW LAKE SOUTH SAMPLES

Parameter Analyzed		Units	964589-001	964589-002
ALINITY		mg/l	58.1	37.9
CONDUCTIVITY		uS/cm	116	84
METALS/TOTAL (WATER-ICP)	AG	mg/l	<.01	-
	AL	mg/l	<.06	-
	AS	mg/l	<.06	-
	B	mg/l	<.01	-
	BA	mg/l	.007	-
	BE	mg/l	<.001	-
	CA	mg/l	13.4	-
	CD	mg/l	<.006	-
	CO	mg/l	<.006	-
	CR	mg/l	<.006	-
	CU	mg/l	<.006	-
	FE	mg/l	.093	-
	K	mg/l	.5	-
	MG	mg/l	1.4	-
	MN	mg/l	.01	-
	MO	mg/l	<.01	-
	NA	mg/l	.9	-
	NI	mg/l	<.02	-
	P	mg/l	<.1	-
	PB	mg/l	<.06	-
	SB	mg/l	<.06	-
	SE	mg/l	<.06	-
	SI	mg/l	2.15	-
	SN	mg/l	<.06	-
	SR	mg/l	.048	-
	TI	mg/l	<.002	-
	V	mg/l	<.01	-
	ZN	mg/l	<.002	-
NITROGEN/AMMONIA		mg/l	.295	.035
/NITRITE		mg/l	.002	.002
/NITRITE+NITRATE		mg/l	.005	.004
/TOTAL		mg/l	.66	.24
PH		Rel.U.	6.88	7.35
PHOSPHORUS/O-PO4		mg/l	<.001	<.001
/TOTAL		mg/l	.062	.011
/TOTAL DISSOLVED		mg/l	.008	.002
RESIDUE/FILTERABLE		mg/l	90	50
/NON-FILTERABLE		mg/l	17	<5
BC CLIENT STUDY CODE			20	20
SAMPLING AGENCY			91	91
SITE IDENTIFIER/NUMBER			E223163	E223163
COLLECTION START DATE		y/m/d	96/09/06	96/09/06
UPPER DEPTH		metres	0.5	6.5
TEMPERATURE ON ARRIVAL		deg.C	2	2

Appendix B

Tributary Stream Data

D.F.O. / M.O.E. Stream Survey Form

DFO / MOE
STREAM SURVEY FORM

Stream Name (geo.): Unnamed Ck (local): Outlet to Unnamed Lk — Access — Method

Watershed Code: [redacted]

Location: ~375m DS of Unnamed Lk (Rainbow Lk Trib) — UTM — Air Photos — Longitude [redacted] 20

Date: [redacted] 6 019 016 — Time: 1405 — Agency — Crew: AH NH I — Photos

C	PARAMETER	VALUE	METH	SPECIFIC DATA
	Ave. Chan. Width (m)	5.5	ST	7.0 3.4 5.4
	Ave. Wet. Width (m)	4.0	ST	5.8 3.4 2.5
	Ave Max Riffle Depth (cm)	35	OM	35 25 40
	Ave Max Pool Depth (cm)		OM	—
	Gradient %	1.0	SC	
	% Pool 0 Rapid 5 Other 70 Dry		OE	
	Bed Char %		GS	
	Bank Area %		GE	
	Debris Stable %	50	GE	
	COVER Total %	25	GE	
	Comp Sum 100% — De Pool 0 — LOD 10 — Boulder 45 — Sm. veg. 0 — Over Veg 30 — Cutbank 15			
	Crown Closure % 10 — Aspect N/W			

BED MATERIAL

	%
Fines (clay, silt, sand <2mm)	10
Gravels (small 2–16mm)	0
Gravels (large 16–64mm)	0
Cobbles (small 64–128mm)	10
Cobbles (large 128–256mm)	20
Boulders (>256mm)	60
Bedrock	0

Dominant 35 cm — Consolidation: L M E

BANKS

C		
1	Heights: 01 — Undercuts: 20	
	Texture: F S L R	
	Continuity: EN CO PC OC UC N/A	
	Valley Channel Ratio: 0-2 2-5 5-10 10+ N/A	
	Dry L M H Flood	
2	Flood Signs Height: 05 — Graded Y N	
	Bars (%): 0 — cm — Unconsol.	
	Water Temp (°C): 1/2 — Turbidity — Cond (25°C)	

OBSTRUCTIONS

C	Type	Loc'n

Over 2.5m

DISCHARGE

Parameter	Value	Method	Specific Data
Wetted Width (m)	2.5	ST	2.4 2.4
Mean Depth (m)	0.2	OM	0.13 0.19 0.25 0.24 0.07
Mean Velocity (m/s)	0.2	FOM	0.15 0.50 0.14 0.24 0.28
Discharge (m³/s)	0.08	FOM	

REACH SYMBOL (Figure)

Height Water Channel Slope — Bed Material

[redacted]

C	Species	No	Size Range mm	Use	Method Ref

STREAM/VALLEY CROSS-SECTION (Looking Downstream)

L — R

PLANIMETRIC VIEW

COMMENTS

Channel Stability — Debris — Management Concerns — Obstructions — Riparian Zone — Valley Wall Processes — Etc.

1 Fresh banks of sedge grasses, willows, alders, some herbs & shrubs

2 Dried grasses caught by overhanging alder branches

Edited by

Data Input

Appendix C

FISH SCALE ANALYSIS

Age Determination Completed By:

A.M.C. Technical Services Ltd.
Melinda M. Hirst
6809 Phillip Road.
Lantzville, B.C.
VOR 2H0

SEE ORIGINAL COPY

FOR SCALE SAMPLE READINGS

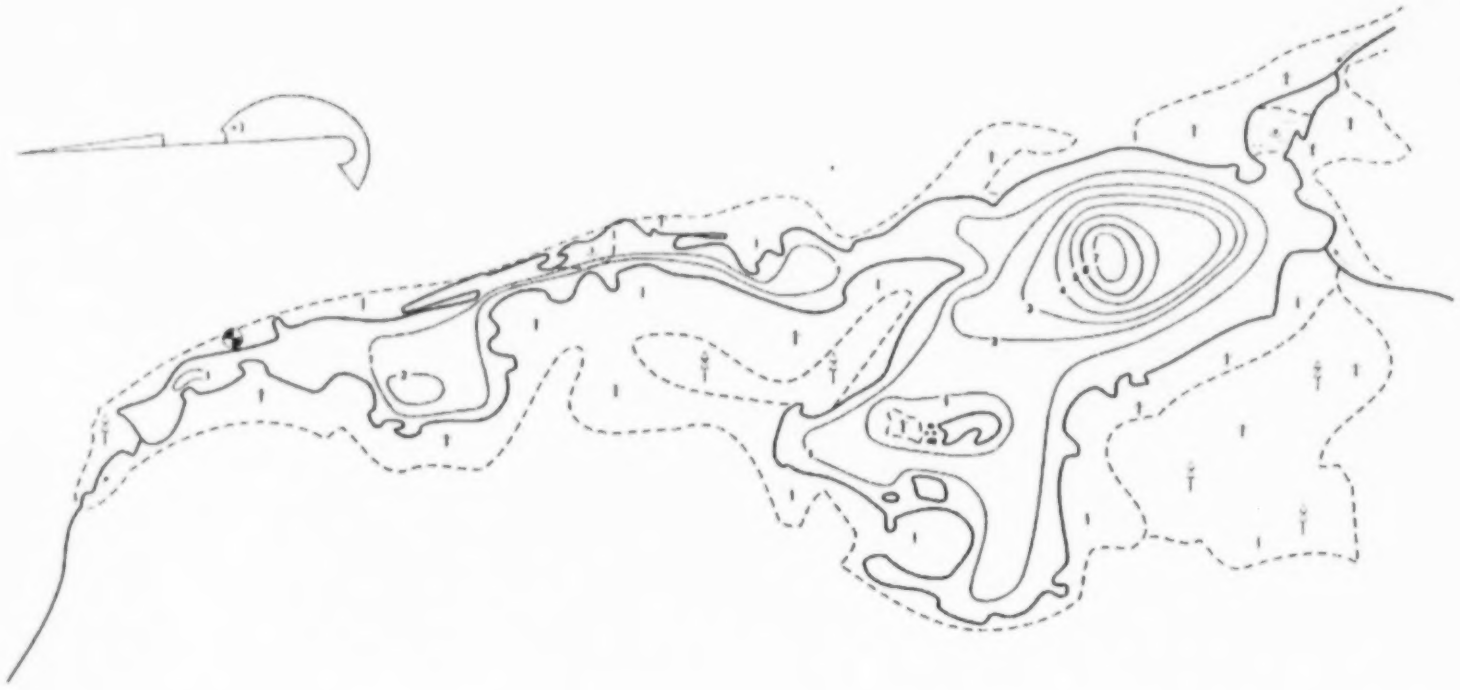
ORIGINAL COPY IS HELD BY

B. C. MINISTRY OF ENVIRONMENT, LANDS AND PARKS

PRINCE GEORGE, B. C.

Appendix D

BATHYMETRIC MAP



Reduced to
34%
of Original Size

STATISTICS AT TIME OF SURVEY		
Elevation	1073	m ?
Surface Area	124900	sq.m.
Area above ice contour	102150	sq.m.
Volume	133179	cu.m.
Mean Depth	1.1	m
Maximum Depth	7.3	m
Perimeter, Mean Stem	4315	m
Perimeter, Islands	163	m
Bench Mark	2.0	m

SURVEYED/BY: M. Hunter, E. Mathew DATE: Sept 3-6, 1996
PLOTTING WATER: E. Air Photo 30BC BC89068 F231 Aug. 0.90

PLOTTED: PJR

Ministry of Environment, Lands and Parks

BY: Jennifer Pellow
B.C. Conservation Foundation

Unnamed Lake
(Fish Hook Lake)

REFERENCED LAKE: 117.2720.1W		UTM COORDINATES: 10 [illegible]
MN: 7.20	PLOT DATE: Jan 15, 1997	SCALE: 1 : 1,000
DIGITIZED: Completed	DIVISION DATE:	
CONTOURS: 1.0 m	APPROVED: Dan Caldwell	NTS 92I 3
TECH CHECK:		